



UNIVERSITI KUALA LUMPUR
ROYAL COLLEGE OF MEDICINE PERAK

FINAL EXAMINATION
MARCH 2026 SEMESTER

COURSE CODE : RCB10502
COURSE NAME : PHARMACEUTICAL MICROBIOLOGY
PROGRAMME NAME : BACHELOR IN PHARMACEUTICAL TECHNOLOGY
(HONOURS)
DATE : 3 JULY 2026
TIME : 9.00 AM – 11.00 AM
DURATION : 2 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please read CAREFULLY the instructions given in the question paper.
2. This question paper has information printed on both sides of the paper.
3. This question paper consists of TWO (2) sections; Section A and Section B.
4. Answer ALL questions in Section A. For Section B, answer THREE (3) questions WITH AT LEAST ONE (1) question from question 3 or question 4.
5. Please write your answers on the OMR answer script and answer booklet provided.
6. Answer all questions in English language ONLY.

THERE ARE 8 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 40 marks)**I) MULTIPLE CHOICE QUESTIONS (20 marks)****INSTRUCTION: Answer ALL questions.****Use the OMR sheet provided.**

1. Select the **CORRECT** statement about Koch's postulate.
 - A. The form of life could arise from non-living matter.
 - B. A theory that describes bacteria can cause diseases.
 - C. All living things are composed of cells.
 - D. Living cells can arise only from pre-existing living cells.
 - E. The rate of cells proliferation is depending on nutrient availability.

2. Identify the virus that potentially causes cancer in humans.
 - A. Human papilloma virus
 - B. Tobacco mosaic virus
 - C. Flavivirus
 - D. Herpes simplex virus
 - E. Rhinovirus

3. Select the **CORRECT** definition of pasteurisation.
 - A. The conversion of sugar to alcohol by yeast in anaerobic condition.
 - B. Alcohol is the byproduct of a catalytic process in the presence of oxygen.
 - C. Alcohol is further converted to acetic acid.
 - D. The process of removing unwanted microorganism using low heat.
 - E. The process of eliminating silkworms using protozoa.

4. Identify the antifungal drug.
 - A. Tamiflu
 - B. Amphotericin B
 - C. Penicillin G
 - D. Pneumococcal vaccine
 - E. Ergosterol

5. Identify the action site of penicillinase against antibiotics.
- A. The aromatic ring of penicillin.
 - B. The ring of β -lactam.
 - C. The allosteric side of aminoglycosides.
 - D. The bacterial peptidoglycan.
 - E. The fungal cell membrane.
6. Select the proper staining method to stain bacterial endospore.
- A. Gram staining
 - B. Giemsa staining
 - C. Negative staining
 - D. Ziehl-Neelsen staining
 - E. Schaeffer-Fulton staining
7. Identify the proper agar content used in agar plate preparation.
- A. 0 to 0.5%
 - B. 1 to 2%
 - C. 3 to 5%
 - D. 6 to 10%
 - E. 15 to 20%
8. Select the **CORRECT** statement regarding potato dextrose agar media.
- A. Commonly used to grow more bacteria.
 - B. Usually appeared as dark brownish concentrated liquid.
 - C. Special supplement component is added to support bacterial growth.
 - D. The agar suitable for fungal culture.
 - E. Used to distinguish between one microbe to another on the same media.
9. Choose the agar medium used to grow fastidious respiratory bacteria.
- A. Blood agar
 - B. MacConkey agar
 - C. Chocolate agar
 - D. Nutrient agar
 - E. Mueller-Hinton agar

10. Select the methods used in bacterial isolation process.
- I. Pour plate
 - II. Spread plate
 - III. Filtration membrane
 - IV. Streak plate
 - A. I and II
 - B. II and III
 - C. I, II, and III
 - D. I, III, and IV
 - E. I, II, III, and IV
11. Identify the tests to be done for non-sterile pharmaceutical products.
- I. Susceptibility test
 - II. Bioburden test
 - III. Test the presence of specified microorganisms
 - IV. Antimicrobial effectiveness test
 - A. I and II
 - B. I and III
 - C. I, II, and III
 - D. II, III, and IV
 - E. I, II, III, and IV
12. Choose the **CORRECT** statements about minimum inhibitory concentration (MIC) test.
- I. Agar dilution is one of the methods for MIC test.
 - II. Broth dilution is one of the methods for MIC test.
 - III. Disk diffusion is one of the methods for MIC test.
 - IV. It is to determine the lowest concentration of the agents that inhibit the growth of bacteria.
 - A. I and III
 - B. I and IV
 - C. II and III
 - D. I, II, and IV
 - E. II, III and IV

13. Select the **CORRECT** incubation duration for sterility test.
- A. 7 days
 - B. 9 days
 - C. 12 days
 - D. 14 days
 - E. 16 days
14. Which of the following are essential for preventing cross-contamination in manufacturing facilities?
- I. Regular employee training in hygiene practices.
 - II. Use of personal protective equipment (PPE).
 - III. Regular sanitisation of environment and equipment.
 - IV. Washrooms are located within the main production area.
- A. I and II
 - B. I and IV
 - C. I, II, and III
 - D. I, III, and IV
 - E. II, III, and IV
15. What is the primary purpose of a laminar air flow cabinet?
- A. To remove toxic fumes.
 - B. To provide a sterile environment by filtering and directing air in a uniform flow.
 - C. To regulate temperature and humidity levels.
 - D. To exhaust hazardous gases safely.
 - E. To air-dry products and protect user.
16. Which cleanroom grade is required for aseptic processing?
- A. Grade A
 - B. Grade B
 - C. Grade C
 - D. Grade D
 - E. Grade E

17. Select sporicidal disinfectants.
- I. Formaldehyde
 - II. Alcohol
 - III. Peracetic acid
 - IV. Glutaraldehyde
- A. I and II
 - B. I and III
 - C. I, III, and IV
 - D. II, III, and IV
 - E. I, II, III, and IV
18. Select the immune component involved in adaptive immunity.
- A. Macrophages
 - B. Natural killer (NK) cells
 - C. Neutrophils
 - D. T-cells
 - E. Mast cells
19. Identify the following antibody.



- A. IgA
 - B. IgD
 - C. IgE
 - D. IgG
 - E. IgM
20. Select the advanced scientific application adopted from the principle of antibody-antigen activity.
- A. ELISA
 - B. Gel electrophoresis
 - C. Northern blotting
 - D. Ultra-centrifugation
 - E. Real-time PCR

II) SHORT ANSWER QUESTIONS (20 marks)

INSTRUCTION: Answer ALL questions in the answer booklet provided.

Each question carries TWO (2) marks.

1. Describe fermentation.
2. Describe magnification power used in compound light microscope.
3. Differentiate **TWO (2)** characteristics between transmission and scanning electron microscopes.
4. State **TWO (2)** types of bacterial flagella.
5. Describe the antimicrobial activity of an amphotericin B.
6. State **TWO (2)** methods of disease development by bacteria in human.
7. List **TWO (2)** conditions to be achieved in sterilisation process using an autoclave.
8. Describe the function of MacConkey agar.
9. Illustrate the growth distribution of obligate aerobe bacteria in a broth culture medium.
10. State **TWO (2)** microbial substances that cause biological spoilage in pharmaceutical product.

SECTION B: MODIFIED ESSAY QUESTIONS (Total: 60 marks)

INSTRUCTION: This section consists of **FOUR (4)** questions.

You are required to answer **THREE (3)** questions in the answer booklet provided.

Question 1 and 2 are COMPULSORY.

Answer EITHER Question 3 OR 4.

Question 1

- (a) Analyse why Gram-positive bacteria are commonly observed in blue or violet colour after the staining procedure. (10 marks)
- (b) Illustrate a schematic diagram that represents the general fungal cell membrane and cell wall. (5 marks)
- (c) Elaborate the procedure of heat-fixed smear. (5 marks)

Question 2

- (a) Explain steam and dry heat sterilisation methods. (10 marks)
- (b) Explain aseptic techniques used to minimise the risk of microbial contamination. (5 marks)
- (c) Illustrate the schematic structure of immunoglobulin-G (IgG) with labels. (5 marks)

Question 3

- (a) Elaborate the procedure of preparing a sterile nutrient broth.
(10 marks)
- (b) Explain **FIVE (5)** types of physicochemical spoilage in pharmaceutical products caused by microorganisms.
(10 marks)

Question 4

- (a) Elaborate the procedure of streak-plate method to obtain single colony of bacteria sample.
(10 marks)
- (b) Identify and elaborate on **FIVE (5)** key factors that contribute to microbial spoilage in pharmaceutical formulations.
(10 marks)

END OF EXAMINATION PAPER